

5 **Mounting System**

By Christopher J. Schura

STATEMENT OF GOVERNMENT INTEREST

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The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without payment of any royalties thereon or therefor.

15 *BACKGROUND*

The present invention relates to a mounting system. More specifically, but without limitation, the present invention relates to a mounting system for military shelters.

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Military operations often require a shelter that is easily transported. Shelters are often modified and populated with electronics, and other equipment, to satisfy a mission peculiar application. Standard shelters come equipped with a limited number of tie down and lift provisions. Typically each shelter comes equipped with one tie-down and one lift ring located at each corner.

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Shelters can be transported by air, ground or sea. When transported by air, shelters are secured to an airborne certified mission pallet, and the pallet is secured to the aircraft's cargo handling system rails and detents. At the time military shelters were introduced to the United States military, shelter tie down provisions were sufficient for structurally securing the shelter in the cargo area of an aircraft. However,

command evaluation of military aircraft service history has resulted in more restrictive crash load criteria. This criteria enhances survivability in the event of a hull loss incident, but limits the applications of newly modified shelters without the installation of additional tie-down points on the shelter and/or structural modifications/re-designs. This results in weight increases to accommodate hard point additions in the shelter frame, in addition to the weight of the pallet itself. In addition, this adds additional problems of prepositioning the pallets, as well as additional wear and tear on the pallets and aircraft, as well as risks in the shelter shifting in transit.

Ground transportation of shelters requires the use of chain tie-down assemblies to secure the shelter to a transport vehicle. Use of chains presents a safety risk for shelter shifting in transit.

Thus, there is a need in the art to provide a mounting system for shelters that incorporates the listed benefits without the limitations inherent in present methods.

SUMMARY

The instant invention is directed to a mounting system that satisfies the needs enumerated above and below.

The present invention is directed to a mounting system that includes an angle assembly and a supporting understructure. The angle assembly is mountable on longitudinal sides of the shelter and the shelter is mountable on the understructure. The angle assembly is attached to the understructure.

The present invention is directed to a mounting system that allows a shelter to be installed on transport equipment with a standard cargo handling system.

The present invention is directed to a mounting system that minimizes use of special handling equipment or special mounting equipment such as pallets or chains.

5 The present invention is directed to a mounting system that ties into the main frame of the shelter.

The present invention is directed to a mounting system that minimizes wear and tear on transport equipment.

10 *DRAWINGS*

These and other features, aspects and advantages of the present invention will become better understood with reference to the following description and appended claims, and accompanying drawings wherein:

15 Figure 1A is a top perspective view of an embodiment of the mounting system for a shelter with the shelter attached to the mounting system;

Figure 1B is a bottom perspective view of an embodiment of the mounting system for a shelter with the shelter attached to the mounting system;

Figure 2 is a top perspective view of an embodiment of the mounting system for a shelter;

20 Figure 3 is a top perspective view of a corner section of an embodiment of the mounting system;

Figure 4 is a top perspective view of an embodiment of the fitting assembly of the mounting assembly;

Figure 5A is a side view of an embodiment of the fitting assembly in the closed or stowed position;

25 Figure 5B is a side view of an embodiment of the fitting assembly in the open or extended position;

Figure 6 is a top view of an embodiment of the mounting assembly; and

Figure 7 is side view of a section of an embodiment of the mounting assembly attached to a standard cargo handling system.

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DESCRIPTION

The preferred embodiment of the present invention is illustrated by way of example below and in Figures 1-7. As seen in Figure 1A, 1B and 2, the mounting system for a shelter 10 includes an angle assembly 100 and a supporting understructure 200. The angle assembly 100 is mountable on longitudinal sides 51 of the shelter 50, specifically the bottom portion 52 of the longitudinal sides 51. The shelter 50 is mountable on the understructure 200. The angle assembly 100 is attached to the understructure 200.

In the discussion of the present invention, the invention will be discussed in a military shelter environment; however, as stated earlier, this invention can be utilized for any type of shelter that needs to be transported such as, but without limitations, a communications shelter, an emergency disaster shelter, a command/office shelter, temporary housing, cargo containers, and the like. The invention will also be discussed in an aircraft environment; however, the invention may be utilized when the shelter is transported by any transport devise such as, but without limitation, a plane, a ship, a train, or any other type of transport vehicle.

In the preferred embodiment, the angle assembly 100 is a self contained angle assembly. As seen in Figures 2 and 3, the self contained angle assembly 100 includes a side base plate 101, a bottom base plate 102, and a set of fitting assemblies 150. The fitting assemblies 150 attach the side base plate 101 and bottom base plate 102. In the preferred embodiment, the mounting assembly 10 includes two angle assemblies 100, one on each side of the understructure 200.

The side base plate 101 may include several side base plate apertures 103. The side base plate apertures 103 may be somewhat evenly spaced along the side base plate 101. The side base plate 101 may also include a side base plate strip 104. The side base plate strip 104 may be located at an end of the side base plate 101 and protrude above the rest of the side base plate 101. In the preferred embodiment of the side base plate 101 there may be two side base plate strips 104, each located on opposite ends of the side base plate 101.

The bottom base plate 102 may include a bottom base plate aperture 105 and a bottom base plate notch 170. There may be two or more bottom base plate apertures 105 and they may be lineally somewhat evenly spaced along the bottom base plate 102. There may be two or more bottom base plate notches 170 which may be somewhat evenly spaced along the outer bottom base plate 102 (on the side opposite to the one adjacent to the side base plate 101).

As seen in Figure 4, the fitting assembly 150 comprises of a bottom plate 151, a side plate 152, and a stiffener brace 153. The bottom plate 151 is attached to the bottom base plate 102, while the side plate 152 is attached to the side base plate 101. The bottom plate 151 may be attached to the bottom base plate 102 by any type of fastener 188, while the side plate 152 may also be attached to the side base plate 101 by any type of fastener 189. The bottom plate 151 is substantially parallel to the bottom base plate 102, while the side plate 152 is substantially parallel to the side base plate 101. In the preferred embodiment, the bottom base plate 102 extends past the bottom plate 151. The stiffener brace 153 is able to brace the bottom plate 151 and the side plate 152 such that the bottom base plate 102 and side base plate 101 are substantially perpendicular to each other when in the extended or open position.

As seen in Figure 5A, the fitting assembly 150 further includes a closed or stowed position such that the bottom plate 151 (and the bottom base plate 102) and the side plate 152 (and the side base plate 101)

are substantially parallel. As seen in Figure 5B, the fitting assembly 150 includes an open or extended position such that the bottom plate 151 (and the bottom base plate 102) and the side plate 152 (and the side base plate 101) are substantially perpendicular. The closed or stowed position may be utilized in the ground mode while the open or extended position may be utilized in the transport mode. As seen in

5 Figure 7, in the open or extended position, the mounting system 10 can be used to secure the shelter 50 to a standard aircraft cargo handling system 61 located on the aircraft floor 60. Typically a standard aircraft cargo handling system 61 includes handling system rails 65 and handling system rollers 66. As previously discussed, the bottom base plate 102 may extend past the bottom plate 151, this extended portion 802 may slip under a handling system rail 65 to secure the mounting system to the cabin floor 60.

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As shown in Figure 4, the fitting assembly 150 may also include a stiffener cross bar 154, a lug system 155, and a lug stiffener interface 156. The lug system 155 is attached to the bottom plate 151 and the side base plate 152 such that the bottom plate 151 and the side plate 152 are pivotally attached and can be adjusted from the open (extended) position to the closed (stowed) position and vice versa. The

15 stiffener cross bar 154 is attached to the stiffener brace 153, and the stiffener cross bar 154 communicates with the lug stiffener interface 156 such that the bottom plate 151 and the side plate 152 can be locked in the open position by sliding the stiffener cross bar 154 into the lug stiffener interface 156.

As shown in Figure 4, the lug system 155 may include a side lug branch 157 and a bottom lug

20 branch 158. The side lug branch 157 is attached to the side plate 152, while the bottom lug branch 158 is attached to the bottom plate 151. They may be attached using any type of fastener. The side lug branch 157 has a first side lug branch end portion 159 and a second side lug branch end portion 160. The bottom lug branch 158 has a first bottom lug branch end portion 161 and a second bottom lug branch end portion 162. The lug stiffener interface 156 is located at the first side lug branch end portion 159. The lug

25 stiffener interface 156 may include forks 186 extending from it in order to stabilize the stiffener cross bar 154 and allow the stiffener cross bar 154 to be able to lock and unlock from the locked position. The

second side lug branch end portion 160 is pivotally attached to the first bottom lug branch end portion 161. The second side lug branch end portion 160 and first bottom lug branch end portion 161 may be attached using alignment pins, rotatable bolts, a dowel system, or any means or method that allows pivotal attachment. The second bottom lug branch end portion 162 is pivotally attached to the stiffener
5 brace 153; any means or method that allows pivotal attachment may be used to attach them. The stiffener brace 153 has a first stiffener brace end portion 163 and a second stiffener brace end portion 164. The first stiffener brace end portion 163 is pivotally attached to the second bottom lug branch end portion 162, while the stiffener cross bar 154 is attached to the second stiffener brace end portion 164. The stiffener cross bar 154 may be substantially perpendicular to the stiffener brace 153 and attached to the stiffener
10 brace 153 at the approximate midpoint of the stiffener cross bar 154.

The understructure 200 may be substantially rectangular; however, it may be any shape. Typically the understructure shape corresponds to the bottom shape of the shelter 50. As seen in Figures 1A, 1B, 2, and 6, the two angle assemblies 100 may be located on opposite sides of the understructure
15 200, particularly on the longer sides of the understructure 200. As seen in Figure 6, the understructure 200 may include forklift channels 201, roller support beams 202, and mounts 203 at each corner. The mounts 203 may include a mount hole 204 to secure the mounting structure 10 to the floor, vehicle, or to standard aircraft cargo handling rails and detents. The forklift channels 201 may be disposed along the shelter's 50 lateral axis.

20 The mounting system for a shelter 10 may be manufactured from any material that lends itself to such an application; however, aircraft grade material is the preferred material.

When introducing elements of the present invention or the preferred embodiment(s) thereof, the
25 articles "a," "an," "the," and "said" are intended to mean there are one or more of the elements. The terms

"comprising," "including," and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements.

Although the present invention has been described in considerable detail with reference to certain
5 preferred versions thereof, other versions are possible. Therefore, the spirit and scope of the appended claims should not be limited to the description of the preferred versions contained herein.